of nature. To record an event according to nature-history is to fix its place in nature; and to assist the student in his record a series of skeleton classificatory schemes is provided. These tabular statements contain many terms new to orthodox science, and serve to illustrate the compiler's predilection for classification.

Nietzsche in Outline and Aphorism. By A. R. Orage. Pp. viii+188. (Edinburgh and London: T. N. Foulis, 1907.) Price 2*s.* 6*d.* net.

AFTER a short introduction dealing with Nietzsche's works, a few pages of "definitions" and a sketch of the philosophy formulated by the champion of nihilism, the compiler brings together a series of his author's aphorisms classified under such headings as "Philosophers and Philosophy," "Morality," and so on As indicative of the searching character of the maxims, one may be quoted from each of the sections mentioned:—"The doer alone learneth"; "Education ruins the exception for the sake of the rule."

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Photoelectric Property of Selenium.

I HAVE lately constructed small seleno-aluminium *bridges* for the electrical measurement of starlight, and it occurred to me to put these bridges into a vacuum to see whether their sensitiveness to light is thereby increased or diminished. One of them, formed, of course, with conducting selenium, had a resistance of 61×10^6 ohms in air and great sensitiveness to light. It was placed in a glass tube connected with an air-pump. About twelve hours after the tube was exhausted to a pressure of about 0·01 mm., the resistance of the bridge had dropped to 61 ohms! From this it fell gradually, and it has now (three days after exhaustion) a resistance of 17·5 ohms.

I conclude, after repeating the result with three bridges, that conducting selenium when placed in vacuo drops in resistance about four million times, and possibly still more. Also it loses completely its sensitiveness to light.

Other things connected with this strange result are under investigation. I use the term "bridge," in preference to "cell" or "resistance," at the suggestion of Dr. A. A. Rambaut. These bridges are far more simple and easily used with a telescope than the "cells" which I used in the observatory of Dr. W. E. Wilson in Westmeath. The selenium employed was specially purified by Prof. Threlfall, who very kindly gave me a supply.

GEORGE M. MINCHIN.

The Electrical Laboratory, Oxford, December 21.

Early Chinese Description of the Leaf-Insects.

"YUEN-KIEN-LUI-HAN," a Chinese encyclopædia completed in 1703, tom. cdxlvi., fol. 9, b, has the following quotation from the "Tau-hwang-tsah-luh," written *c.* ninth century:

"In Nan-hai a peculiar manner of bees (or wasps) live on the *kan-lan* tree (*Canarium pimela* or *C. album*). They look as if this tree's leaves were grown with hands and legs, wherewith to grasp branches and so deftly adpress themselves thereto that they are quite indistinguishable from the foliage. Therefore, to collect them the southern people used to fell the tree first and await the withering and falling of its leaves; and only then they are enabled to discern and gather the insects, which they employ as philter."

Nan-hai, literally "Southern Sea," was anciently the appellation of a province, the present Kwang-tung, but sometimes it was applied to the Indian Archipelago (Bretschneider, "Botanicon Sinicum," part iii., p. 579).

But for specifying them as bees or wasps, this Chinese account of the mimetic articulate would appear fairly to tally with that of the leaf-insects (Phyllium). Probably it is a very early, if not the earliest, description of these Orthoptera.

KUMAGUSU MINAKATA.

Tanabe, Kii, Japan, November 14.

THE SALMON.[1]

WE have no hesitation whatever in advising all persons interested in the salmon, whether as fishermen, naturalists, or legislators, to add this book to their libraries. The blue and grey covers of the official reports of the Scotch Fishery Board and the Irish Department of Agriculture contain a great deal of most valuable information bearing upon the life and habits of the salmon, and, so far as Scotland is concerned, Mr. Calderwood has now collected into the book under review the information spread over a series of reports. In the case of Ireland the reports of salmon-marking experiments are now published separately in pamphlet form, and deserve a far wider circulation than they possess.

Mr. Calderwood, we think wisely, confines his book almost exclusively to the life-history of salmon in Scotch waters, but is careful to direct attention to points in which the habits of the same fish in some or all Irish rivers appear to differ in points of detail. He would have us, in the first place, regard the salmon as essentially a marine fish, and in this he may be right, though we see no real reason why an anadromous species need be definitely relegated to the category of either fresh-water or marine forms. We are, however, quite in agreement with his view that the Salmonidæ are derived from originally marine ancestors, and would even hazard the suggestion that the presumably herring-like stock from which the Salmonids and Alepocephalids are derived may have been driven in the struggle for existence either to adopt an anadromous life or fresh-water habitat (as in Osmerus, Salmo, Thymallus, and Coregonus), or to retire into the deep sea like the Alepocephalids, Argentina, Microstoma, and Bathylagus found off our own coasts.

We must, in any case, look upon the salmon as a fish growing and feeding in the sea, resorting to fresh waters when feeding ceases on the approach of the spawning season, and spending the early part of its life near the place of its birth until strong enough to venture seawards; this is the standpoint from which we must regard and seek to explain the known phenomena of its life-history.

It is now more than forty years since the discovery was made that the first two years of the salmon's life are normally spent in the parr stage, while a few parr may move seawards in the first year and a certain proportion may spend three years in fresh water. Mr. Calderwood attributes this discovery to the Stormontfield investigations, but we fancy he is so far in error here that the percentages he quotes were really derived from Dunbar's Thurso experiences, communicated by him to Archibald Young when Commissioner of Scotch Salmon Fisheries.

At a length (in the Tay) of five or six inches, the parr assumes the silvery livery of the smolt, and passes seawards, in Scotland, so far as observed, always in spring. The second late summer or early autumn migration of smolts, noted annually in some Irish rivers, and intermittently in others, has not yet been observed in Scotland, and accordingly is not here dealt with.

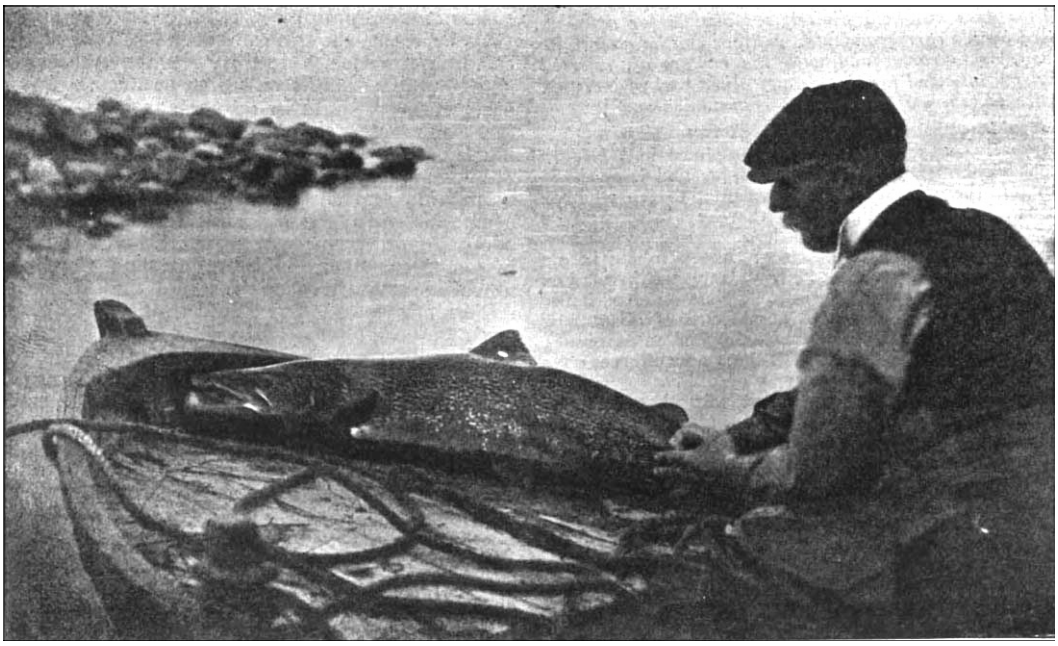
On reaching the sea the smolt for a time eludes the ken of man, or, at all events, all fishing gear ordinarily employed by him, until it reappears as a grilse. This, hitherto little known, period of the fish's history is admirably handled by Mr. Calderwood. The few British and Irish records of young salmon between the lengths of six inches and two feet are carefully examined, and Dahl's Norwegian researches are cited

[1] "The Life of the Salmon; with Reference more especially to the Fish in Scotland." By W. L. Calderwood. Pp. xxiv+162. (London: Edward Arnold, 1907.) Price 7*s.* 6*d.* net.

to show that this period is normally spent in offshore waters, as occasional captures in mackerel nets would suggest. The marking of Tay smolts and control observations of the rings upon the scales of grilse have now shown that the first fish re-appear in the estuaries as grilse twelve to fifteen months after leaving the river as smolts, and that some fish may spend a further summer in the sea before seeking fresh water, then to re-appear as small spring fish. It would, however, be premature to assume that no fish re-ascend in the year of their descent as smolts.

This observation leads us naturally to the second essential fact of a salmon's life-history, that of the distinction between the "short migration" and the "long migration"; that is between the fish which return to fresh water in the summer or as spawners in the autumn or winter of the year of descent as kelts, and those which spend a longer period in the sea and return as clean fish early in the following spring. The difference may be well illustrated by the cases of two Irish fish of the same sex (female), weight (5 lb.) and length (2 feet 1 inch), marked as slats on the same day, January 18, 1902, and at the same place, one of which was re-captured on July 22, 1902, weighing 11 lb. and 2 feet 5 inches long, while the other was re-captured on June 16, 1903, weighing 18 lb. and 2 feet 11 inches long. It is possible that in some cases the "long migration" period may extend over two years, and it by no means follows that any individual fish is either always a short-period fish or always a long-period fish. A remarkable fact shown by results published up to date is the preponderance of short-period fish in Ireland and of long-period fish in Scotland.

Another problem is raised by the winter and spring fish of some rivers; do such fish merely ascend a short distance and then drop back again to the tide-way for further feeding before finally running to spawn, or do they ascend to the head-waters of the river they enter so soon as the physical conditions admit? The unfortunate sacrifice of the Lismore Weir marking experiments to the objections of certain anglers has undoubtedly deprived us of an opportunity of reaching some conclusion upon this most important point; so far as the experiment went it certainly pointed to such fish not remaining in the Blackwater until the following spawning season, but dropping back to the estuary before ascending to the redds. Mr. Calderwood, in former papers, has adduced evidence of what he terms a "pausing habit" of winter clean fish in the lower waters of the Spey, but he now states that "in Scotland we have not evidence that clean fish are in any sense temporary visitors to fresh water or habitually drop back into the sea" He moreover notes that the spring fish entering the Ness have already reached the Garry by early in February, while the Tay fish are not found above Loch Tay until May or later. This question is closely connected with the further one, why are some rivers early rivers and some late rivers? To the latter question Mr. Calderwood devotes considerable space, and his remarks, whether accepted as providing an answer or not, are well worthy of attention.



A male salmon in full spawning livery, fresh from the sea in November. The fish has just been marked on the dorsal fin before its return to the river Tay at Almondmouth. From "The Life of the Salmon."

We can but briefly allude to many other points of interest touched upon by this book, such as the causes prompting a salmon to seek fresh water, the effects of temperature on a run of fish, and the question of fish "changing rivers."

Of the salmon's life in the sea until it comes coastward we can but assume at present that it is spent in pursuit of the shoals of herring or mackerel, while noting that the drift-net fishery for salmon off the west and north-west coasts of Ireland is conducted in late spring and early summer, sometimes as much as ten miles from the coast.

We reproduce an illustration showing a November fresh-run male salmon in full spawning livery, photographed before its return to the Tay after marking; the silver marking plate is seen on the dorsal fin. The Irish marks are similar in form and similarly

affixed, but oxidised in place of being left bright. Recently a new mark has been introduced in Ireland, consisting of a small numbered tag attached to the base of the dorsal fin by means of a ring; marks of this pattern are made of various size to suit any fish from a smolt upwards.

ENTOMOLOGY FOR THE YOUNG.

THIS book is not a scientific treatise; it is intended, as the author tells us in the preface, "to encourage the intelligent life-study of insects by our younger folk, to discourage collecting, and to stimulate the profitable employment of one's eyes and ears in town or country." This object is a very estimable one, and the author has done much to produce a book admirably adapted for this purpose.

It is divided into seven chapters, each containing many stories of insect life. The general introduction

Green-veined White Butterfly resting. From "The Story of Insect Life."

deals with all manner of subjects in a clear and very simple way, such as structure, eggs, metamorphosis, fertilisation of plants, the story of the wild arum, resemblance of plants to insects, &c. Then follows a chapter on beetles, some of our common forms being simply described. Earwigs, cockroaches, crickets, and grasshoppers form the theme of chapter iii., and dragon-flies, May-flies, &c., that of chapter iv. Now and again the author, unfortunately, pounces on scientific names. For many reasons, in a book for young people, these are best left out, particularly if wrong ones are used, as on p. 104, where the steel-blue wood wasp (*Sirex juvencus*) is called *Sirex noctilo*!

Some of the stories form delightful reading, such as the story of the hive bee, p. 207.

Seventy-six pages are devoted to butterflies and moths, and then the final chapter gives a few brief notes on bugs, frog-hoppers, gnats, and other flies that may attract the young person's attention.

The illustrations from photographs are mostly excellent, and some beautiful pictures are reproduced of localities where water insects abound. The author, unfortunately, in one has made a grievous error, for in Fig. 119 he gives the head of a male mosquito, *Theobaldia annulata*, as that of a female gnat, and refers to this in the text. For the young we should be just as careful to be accurate as for people more matured.

The eggs of the vapourer moth are not in a natural position in Fig. 17, and, again, a badly set and damaged tortoiseshell butterfly is clumsily stuck on an iris blossom (Fig. 86) in a very unnatural way. There are also many entomological errors.

The plates will be sure to attract the young mind, and they are excellently reproduced, but the artist appears to have a quaint idea of some of the insects, such as the blow-fly on plate viii., and also the water boatman. In spite of such faults, the book is one that may be recommended to all young folk, as it not only supplies a want, but fills that want in a clear and pleasant style. FRED. V. THEOBALD.

[1] "The Story of Insect Life." By W. P. Westell. Pp. 339; illustrated. (London: Robert Culley, n.d.) Price 5s. net.

LORD KELVIN.

IN NATURE for September 7, 1876, there was published, with the engraved portrait by Jeans, in the series of "Scientific Worthies," an account of Lord Kelvin, then Sir William Thomson, and of the scientific work, extending then over more than thirty years, by which he had rendered himself illustrious in physical science. Thirty-one years have elapsed since that appreciation was written, and now we have to mourn that this life of wonderful activity has come to its natural close. At the ripe age of eighty-three, as full of honours as of years, Lord Kelvin has passed away. To say that his eye was not dimmed, nor his natural force abated, would be scarcely strictly true, yet he retained to the last the exercise of his intellectual powers. The vigour and keenness with which he entered into the discussions at the British Association meeting at Leicester in August last were truly remarkable at his advanced age. It was in the course of making experiments in a corridor in his country house, Netherhall, Largs, that he contracted the chill which brought about the fatal end.

The article of 1876 gave in some detail those scientific achievements which had then made him famous; and a glance at its contents will show in brief what these were. While still an undergraduate at Cambridge, he had made valuable mathematical investigations in relation to Fourier's theorems, and in their applications to the motion of heat and to hydrodynamics. In these investigations will be discovered the foundation of the method of evaluating geological dates from underground temperatures upon which subsequently he built his famous conclusions as to the age of the earth. In the years which followed, during his early occupancy of the chair of natural philosophy at Glasgow, Lord Kelvin was largely occupied, in constant association with Joule, with the development of thermodynamics, to which not his least contribution was the theory of the dissipation of energy. This was followed by investigations into electrostatics and the theory of magnetism, contact electricity, thermo-electricity, the mechanical energies of the solar system, the calculation of the tides, the size of atoms, and vortex motion. That which, however, directed popular attention to his scientific attainments was not so much these deep investigations as his connection with the more practical problems of ocean telegraphy. The pos-